Sys Rev Pharm 2021;12(3):16-19
A multifaceted review journal in the field of pharmacy

Modern Issues Of Diagnosis And Treatment Megaureter Inchildren

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ABSTRACT

Congenital malformations of the ureters, in particular the megaureter, are a frequent and reasonably common pathology of the urinary system. According to different authors, it makes up from 22% to 40% of all malformations. The increase in the number of early diagnosis of this disease, the lack of a unified view of the factors of their development, the use of various diagnostic methods, the presence of a large number of surgical treatment methods, the high percentage of unsatisfactory results and the prospect of developing new treatment algorithms make this disease an urgent issue of pediatric surgery.

Keywords: Megaureter, reflux, obstruction, ureters, anomaly, dysfunction, ureterovesical segment.

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RELEVANCE

Annually there are quite a lot of works in scientific children's surgical publications concerning the problem of obstruction of the ureter in children. This is explained by the high frequency of development and an increase in the number of early diagnosis of the disease, the lack of a common view on the factors of their development and as a result - the use of a large number of methods of surgical treatment, as well as methods of preoperative algorithms to prepare the patient for treatment, as well as the prescription of postoperative care and drug treatment. [4].

Congenital ureterine malformations, in particular megaureter, is a frequent and quite common pathology of the urinary system. According to different authors, it accounts for 22% to 40% of all malformations. [2]

Up to 40% of cases of congenital urinary tract abnormalities occur among children's patients with some or other diseases. Congenital ureterine abnormalities are most often diagnosed at the age of several months to 10 years, there are cases of accidental diagnosis when investigating other complaints. Also, the level of development of diagnostic methods and the general state of medicine in each region is of great importance. [1,19]

The manifestation of congenital ureterine abnormalities in children depends in most cases not on the stage, but on the period of the beginning of the disease and the emergence and increase in the number of secondary complications in each patient [12,20].

Despite the annual development of medicine, according to a number of authors, the megaureter has tended to increase the number of diseases, violation of urodynamics caused by this pathology creates favorable conditions for the development of ascending infection (pyelonephritis) and scarring of renal tissue with further loss of their function. Even in the presence of modern diagnostic systems and already mastered methods of treatment of this disease at late diagnosis and inappropriate treatment tactics, 23-27% of children develop one of the most formidable complications of chronic kidney failure (CKF) [3,6,13].

In case of early diagnosis and attempt of a surgical solution of this disease problems, unsatisfactory results of surgical treatment are observed in 10-30% of patients, which gives ground for further research and implementation of the latest achievements of medicine and pharmacology in solving the problem [20].

Morbidity. Megaureter is a common diagnosis in children visiting a pediatric urologist, which accounts for 28% of children with urinary tract obstruction. The diagnosis is more common in boys than in girls, and in most cases is on the left side. It may be bilateral in 25% of cases, and the contralateral kidney is absent or dysplasia in 10-15% of cases. [11,12,13].

Embryology and pathophysiology. There have been many scientific studies describing the histological origin of the megaureter, and although they often differ from one another, all studies often reveal an abundance of connective tissue in the abnormal ureter [17,18,19]. Lee et al. have demonstrated that the collagen to smooth muscle ratio in the normal ureter is 0.52, while in obstructive and reflux megauretes, it is 0.78 and 1.99 respectively [21]. Other researches have shown the presence of smooth muscle cells in these ureteras, which produce abnormally increased amount of collagen. It has also been shown that muscles in these segments of the ureter have an abnormal response to neurotransmitters, emphasizing the abnormal behavior of these cells [17,18,19,20].

The primary obstructive megaureter is considered a functional obstructive. It is believed that the ureterus has an aperistal jucstavesical (adynamic) segment, which leads to insufficient peristalsis of the ureter and, therefore, to urinary outflow. This distal segment was examined histologically, and it was found to contain elevated collagen levels of types I and III (mainly type I). It is this increased fibrosis that is connected with the disturbance of intercellular connections and leads to arrhythmias and ureterine obstruction [7,8,9,11]. However, there are many other theories concerning the development of obstructive megaurettes. Some scientists have proved the atrophy of internal longitudinal muscles in these segments of the ureter (longitudinal muscles transmit peristalsis) and hypertrophy of external, compressive circular muscles, which leads to obstruction [12,13].

Other histological data, which is said to reflect the causal aspect of an obstructive megaureter, include distal segments of the ureter without muscle tissue, but simply a fibrous, static end. At the same time, others have documented distal segments of the ureter with non-

ureteral, non-detestructive muscle that overreacts to the adrenergic stimulus, resulting in almost tonic contraction [1,14,15,16]. It was found that the proximal enlarged ureter segment was also found in altered connective tissue, and this fibrosis and the enlargement itself may lead to ureteral arrhythmias and poor transmission of peristaltic waves. It is important to note that dilation of the upper parts of the tract (although it itself represents a significant pathology) plays an important role in the reaction of the urinary tract to the presence of obstruction. The urinary system in children is more flexible than in adult patients, and this expansion reduces pressure by allowing the kidneys to produce urine in the urinary tract [1,2,3]. In addition to the above described adynamic segment on the terminal ureter in the obstructive megaureter, other anatomical causes may lead to a similar clinical scenario. Both congenital distal ureteral strictures and ureteral distal valves may be almost indistinguishable from the classical obstructive megaureter [17,18,19]. Secondary obstructive megaureter is an obstructive process, secondary to increased intravesical pressure of any other cause. Common causes are spinal dystraphism and the neurogenic bladder, which can raise detrussor pressure to more than 40 cm of water, causing physiological obstruction and hydronephrosis. Neurogenic urinary dysfunction, if it is serious enough to raise bladder pressure above a safe range, may also be a cause. Rear urethral valves or other causes of infravesical obstruction may also lead to similar results [1,18,19]. Other anatomical causes of secondary, distal ureterine obstruction include ureterocele, ectopic ureter, bladder diverticula, periurethral fibrosis, and external compression by retroperitoneal tumour, mass or aberrant vessels [1,18,19].

The primary and secondary reflux megaureter is simply a reflux ureter that appears to be expanded. The pathology simulates the pathology of any reflux ureter with a short intravesical ureter and a submucosal tunnel. They may be associated with anomalies of the uretero vesicular segment, making reflux more likely, such as periureteral diverticulae. In some children, in addition to the ureter, the mega-cyste syndrome is observed, where the bladder is markedly dilated and has a thin wall (18). The distal segment of reflux megaureter also shows histological disorder with increased fibrosis (very similar to obstructive megaureter); however, type III collagen is predominant in these cases (11).

The primary non-obstructive, non-reflux megaureter - most megaureter cases end up being non-obstructive, non-reflux species. This is very encouraging, as it confirms that simple observation will serve as therapy for most children. However, as already mentioned, the absence of obstruction can be difficult to prove [1,18]. When assessing a megaureter, there are some important points to consider that can help prevent unnecessary intervention. First of all, the fact that a child was born with a functioning kidney suggests that any degree of ureterine obstruction is not complete, because the kidney would not have formed normally under conditions of an early or very high degree of obstruction. The fetus produces more urine than the baby, and if this diuresis precedes the natural sewerage of the distal portion of the ureter, a megaureter may develop (delayed maturation hypothesis). Since the ureterus in the fetus is very obedient, a slight increase in urinary flow may cause ureteral dilation even without obstruction and reflux. It is this compatible urinary system that allows the baby's kidney to continue to function in conditions of varying degrees of obstruction or reflux, without suffering from trauma under pressure, so expansion may not harm the baby. [1,2,3,18].

Secondary non-constructive non-reflux megaureter. Cases of non-constructive and non-reflux megaureter for reasons unrelated to ureterine anatomy are called secondary. It is in this category that dilatation due to high fetal urinary output, increased ureterine elasticity (due to extracellular matrix composition, including increased collagen type II and elastin concentration), or transient obstruction during development (e.g. ureteral fold) or delay in normal peristalsis may occur [18]. There are many other relatively benign causes of secondary megaureter. For example, urinary tract infections may lead to temporary ureteral expansion due to the presence of bacterial endotoxins that may inhibit peristalsis. As already mentioned, any increase in urinary output may lead to an expansion of the fetal/child collection system. There are certain possible causes of diuresis, including lithium toxicity, non-sugar or diabetes mellitus, sickle cell nephropathy or psychogenic polydipsia. [18].

Diagnosis. Nowadays, the use of prenatal ultrasound has increased the diagnosis of the megaureter. Cases detected at a later age are often accompanied by urinary tract infection, hematuria and/or pain [21,22]. After diagnosis (intrauterine or postpartum), the first and most available method is kidney and bladder ultrasound. Ultrasonography is a simple, safe, and painless study that can provide important information on kidney size, parenchyma thickness, echogenicity and architecture, as well as renal pelvis and ureter expansion, bladder wall thickness, and in some cases the urethra. Although an experienced pediatric surgeon may conclude some functional diagnoses from ultrasound, it is important to remember that ultrasound is only descriptive and does not provide detailed information on renal function (19,21).

Subsequently, an integral part of the diagnosis of the megaureter is to carry out radionuclide imaging and excretor urology, which allow to assess the structure of the kidneys and urethra and their functional status.The radionuclide research reveals a decrease in accumulation and excretion of the radiopharm drug by the parenchyma and collective kidney system. At the same time, it is necessary to take into account the dependence on age for removal of the radiopharm drug in children of the first weeks of life.The extreme urograms visualize the delay in kidney discharge of contrast agent, disturbance of the collector system, expansion and curvature of the ureter. For this study, X-ray contrast substance is injected at the rate of 1-2 mg/kg of body weight, but not more than 60 ml per study. Images are taken in 1,5,15,30 min from the moment of injection and after urination. It is also possible to take delayed imaging after 1, 2 and 3 hours if necessary.For a more accurate diagnosis, a specialist can perform a cystorheterography to determine the degree of reflux, through the installed catheter in the bladder is injected a warm solution of iodine-containing X-ray-contrast compound before the mandatory call. Images are taken when the bladder is full during bladder discharge and on an empty bladder. Patients may also undergo cystoscopy, which can visualize the signs of chronic cystitis (bullous or granular formations on the mucous membrane), narrowing or vice versa, ureteral mouth gaping, deformation and possible dislocation.In addition to the above mentioned imaging methods, the most crucial part of the examination of children suffering from

various forms of mega-urter is the histological examination of the operating material, which allows morphological verification of the diagnosis, study of structural changes in ureteral tissue for further improvement of the treatment tactics.

Treatment. The primary reflux megaureter. All pediatric surgeons are familiar with standard reflux treatment and the treatment of the primary reflux megaureter is no different. Initially, even with severe dilatation and severe reflux, medical treatment (antibiotic prophylaxis) and observation are all that is needed. Surgical interventions are only considered for persistent high reflux in older children (especially with recurrent pyelonephritis) and in children who have not been treated. Because the complication rate of uretero neocystostomy is high in children under a year old, skin ureterostomy or vesicostomy can be used as a temporary measure in children who require surgery (18).

Secondary reflux or obstructive megaureter. Obviously, secondary reflux needs to be treated by eliminating the cause of high intravesical pressure leading to reflux. For example, in children with posterior urethral valves and reflux, often ablation of the valve and proper treatment of the bladder lead to rapid resolution of the reflux. Neurogenic bladders with high pressure Detrusor leakage point (> 40 mm water column) must be treated with a combination of medication (i.e. anticholinergic treatment), pure intermittent catheterization and surgery if necessary. Often, cases of the prune abdomen and non-sugarine diabetes can be controlled by observation, suggesting that appropriate medication therapy begins [18].

Negative or obstructive megaureter. In cases where the megaureter may be obstructed, the decision to surgicalize is difficult. Even in cases of obvious obstruction, early surgery may have a higher incidence of complications. It should be a basic principle that no operation should be performed unless the kidney function is significantly affected and urinary tract infection is not a serious problem. Instead, suppression of antibiotics with careful monitoring is all that is required. In general, surgical recovery is required between the ages of 1 and 2 if the condition is deteriorating [1,3,18].

In some rare cases, early intervention is required. Other surgical options, such as looping ureterostomies, reflux reimplantation and even urethral stent placement, should be considered to prevent complications associated with nonreflux therapy, re-installation surgery in children. In terms of algorithms to decide which children will need surgery, no good parameters define the children who will decide and those who will deteriorate. In general, over 70% of cases are resolved within 2 years of observation. Although there is no correlation with any determinable factors (such as the degree of hydronephrosis) for which children will need surgery and which will not, there is a correlation between the age of resolution and the degree of dilatation in infants [24].

Surgical methods. Surgical methods used for the final treatment of reflux and obstructive mega-ureter include re-implantation of the ureter of the dilated ureter. The same parameters that are used to ensure a successful operation as the traditional reimplant surgery are also applicable to megauretters (i.e. the ratio of tunnel length 5: 1 to ureter diameter). In the case of obstructive megaureaters, the distal adynamic segment must be completely amputated from the ureter, and often after the obstruction has been removed, the ureter diameter is reduced to a size that allows for standard reimplantation without narrowing it. However, most reflux and obstructive megaureter require a narrowing to ensure that the size of the submucosal tunnel is suitable for children's bladder [2,3,18].

More than 200 methods of surgical correction of the ureter have been proposed so far by surgeons. The choice of the method and method of surgical intervention is determined by the nature and degree of clinical manifestation of the disease, the presence of complications, the general condition of the patient and also the experience of treatment of the corresponding patients by the medical institution [12,17].

Analysis of the literature of recent years has shown that conservative treatment of malformation does not yield the desired results, it can be used in the preoperative period because the most competent selection of drugs can achieve remission of pyelonephritis for several weeks and very rarely - for several months. However, it is reasonable to temporarily refuse surgical treatment if kidney function is normal because it is extremely difficult to make a differential diagnosis between neuromuscular dysplasia of the ureter, functional obstruction of the ureter, disproportion of its growth in children of early age [7,11].

The technical variety and peculiarities of different methods should be considered by the attending physician and their choice should be based first of all on the anatomical-functional state of the bladder ureterine junction. The right choice of surgical intervention method is the key to successful treatment of a child's disease caused by lesion of the bladder and ureterine segment. Besides, the inclusion of the method of the operative correction of the bubble-ureterral segment in the algorithm of therapeutic and diagnostic manipulations in the treatment of children with DMR and various forms of supravesical obstruction allows forecasting the outcome of the disease in the postoperative period [17].

CONCLUSION

The most etiopathogenetically grounded approaches of surgical treatment of the bladder-ureterral segment affection in children are the methods aimed at increasing the length of the intra-uterine ureteral segment by means of laying a submucosal tunnel. The antireflux operation Politano&Leadbetter, introduced into practice in 1958, became the most popular of these suggested methods of treatment [10]. The main principle of the surgical operation was to create a submucosal tunnel for implantation of the ureter in it, cut off from the original location of its mouth. The high percentage of positive results of this operation, reaching 95%, determined the wide application of this technique. E. Ya. Guseynov points out that along with the length of the submucosal tunnel, a significant role in the reliability of antireflux protection of the vesicular ureterinary segment plays the so-called "supporting" function of the Lieto triangle. If to consider the reasons of imperfection of this or that operational technique of correction of the bladder-ureterral segment, the author relies on the following anatomical-functional criteria: length of the intravesical part of the ureter, lateral ectopy of the ureter's mouth, "reference" function of the Lieto triangle, degree of angle of ureteral entry into the bladder.Thus, the analysis of the literature has allowed to define and reveal that the questions of early diagnostics and correctly balanced treatment of the mentioned urinary system disease in children today remain among the actual problems of pediatric surgery and urology.

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